

Sem	Part	Course	Course Title	Credits	Marks			Hrs/week
					CAM	TEE	Total	
I	I	Language	Tamil I / Hindi I / French I / Malayalam I	3	25	75	100	5
	II	English	English I	3	25	75	100	5
	III	Core	Digital Logic and Computer Architecture	4	25	75	100	6
	III	Allied	Numerical and Statistical Methods	5	25	75	100	5
	III	Core	Web Designing Lab	2	40	60	100	6
	IV	Skilled Based Subject	General Awareness	2	25	75	100	3
II	I	Language	Tamil II / Hindi II / French II / Malayalam II	3	25	75	100	5
	II	English	English II	3	25	75	100	5
	III	Core	C Programming	4	25	75	100	4
	III	Allied	Discrete Mathematics	5	25	75	100	4
	III	Core	Data Structures	3	25	75	100	4
	III	Skilled Based Subject	C Programming and Data Structures Lab	2	40	60	100	6
	IV	Environmental Studies	Environmental Awareness	2	25	75	100	2
III	I	Language	Tamil III / Hindi III / French III / Malayalam III	3	25	75	100	5
	II	English	English III	3	25	75	100	5
	IV	Basic Tamil / Advanced Tamil	Basic Tamil I /Advanced Tamil I	2	100	NA	100	2
			Non- major Elective		40	60		
	III	Core	Microprocessors	4	25	75	100	3
	III	Core	Object Oriented Programming with C++	4	25	75	100	3
	III	Allied	Operations Research	5	25	75	100	3
	III	Core	C++ Programming Lab	3	40	60	100	5
	IV	Skilled Based Subject	Professional Communication	2	25	75	100	4
	V	Extension Activities	NSS / Computer Awareness Programme	1	Grade **			-
IV	I	Language	Tamil IV / Hindi IV / French IV / Malayalam IV	3	25	75	100	5
	II	English	English IV	3	25	75	100	5
	IV	Basic Tamil / Advanced Tamil	Basic Tamil II /Advanced Tamil II	2	100	NA	100	2
			Non- major Elective		40	60		
	III	Core	Database Management System	3	25	75	100	4
	III	Core	Python Programming	3	25	75	100	3
	III	Allied	Principles of Management	5	25	75	100	3
	IV	Value Education	Indian Society, People and Culture	2	25	75	100	3
	III	Skilled Based Subject	Python and DBMS Lab	2	40	60	100	5
V	III	Core	Cyber Security	4	25	75	100	4
	III	Core	Java Programming	4	25	75	100	5
	III	Core	Operating Systems	4	25	75	100	4
	III	Core	Software Engineering	4	25	75	100	5
	III	Elective	Elective - I	4	25	75	100	5
	III	Core	Java Programming Lab	3	40	60	100	5
	IV	Skilled Based Subject	Aptitude*	2	25	75	100	2
VI	III	Core	Computer Networks	4	25	75	100	3
	III	Core	Web Technology	4	25	75	100	4
	III	Core	Web Technology Lab	3	40	60	100	4
	III	Core	Project and Viva Voce	7	25	75	100	12
	III	Elective	Elective - II	4	25	75	100	4
	IV	Skilled Based Subject	Soft Skills *	2	25	75	100	2
<b>Total</b>				<b>140</b>	<b>1195</b>	<b>3105</b>	<b>4300</b>	<b>180</b>

NA : Not Applicable, Basic / Advanced Tamil - CA only

\* Both CAM and TEE marks will be evaluated internally.

**Elective List- I**

- 1 Augmented Reality
- 2 Big Data Analytics
- 3 Open Source Software
- 4 Embedded Systems and its Applications
- 5 Air and Sea Navigation

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**Elective List- II**

- 1 Mobile Programming
- 2 Cloud Computing
- 3 Internet of Things
- 4 Enterprise Resource Planning
- 5 Intellectual Property Rights

Project & Viva Voce Split up	
CA (25 marks)	
Review I	10 Marks
Review II	15 Marks
TEE (75 Marks)	
Viva-Voce	50 Marks
Documentation	25 Marks

G. P. R. S.

BII - 03  
2019 - 20

**Dr G R DAMODARAN COLLEGE OF SCIENCE (Autonomous), COIMBATORE**  
**B Sc (Computer Science)**  
**Effective from the academic year: 2019-20**

**FIRST SEMESTER**

**CORE: DIGITAL LOGIC AND COMPUTER ARCHITECTURE**

**Objective of the subject:** The objective is to provide the students an insight into the fundamental building blocks of a computer. To provide the basic knowledge on computer arithmetic, machine language Instruction Set, Counters, I/O and System Bus Design and Memory Systems.

**UNIT I:** (10 Hrs)

Number Systems: Decimal, Binary, Octal and Hexadecimal – Conversion from one to another – Binary Addition, Subtraction, Multiplication and Division – Complements in binary and other number systems – ASCII codes – BCD weighted – Excess three – Gray codes.

**UNIT II:** (10 Hrs)

Logic gates : AND, OR, NOT, XOR, NAND, NOR and XNOR gates – Truth tables – NAND and NOR as Universal Building Block – Laws of Boolean Algebra – DeMorgan's Theorem – Simplification of Boolean expressions – Karnaugh Maps – Two and Three variable maps – Four Variable Map – Product of Sums and Sum of products simplification – Don't care conditions.

**UNIT III:** (10 Hrs)

Combination Logic : Introduction – Adders – Binary Half adder – Full adder – Parallel Binary adder – Serial Binary adder – BCD Adder – Subtractors – Half subtractor – Full Subtractor – Decoders – Encoders – Multiplexers – Demultiplexers.

**UNIT IV:** (10 Hrs)

Input-Output organization: Input-output Interface - I/O Bus and Interface Modules- Asynchronous data transfer (strobe control and handshaking) - Modes of transfer: Programmed I/O - Interrupt Initiated I/O - Software Considerations. Input-output processor: CPU-IOP Communication.

**UNIT V:** (10 Hrs)

Memory organization: Memory hierarchy. Main memory: RAM and ROM Chips - Cache memory: Associative Mapping- Direct Mapping. Virtual memory: Address Space & Memory Space- Address Mapping Using Pages-Associative memory Page Table-Page Replacement.

**TEXTBOOKS**

1. **Digital Logic and Computer Design**, M.Morris Mano, Prentice Hall, 14<sup>th</sup> Impression 2012.
2. **Digital Computer Fundamentals**, Thomas C.Bartee, Tata McGrawHill, Sixth Edition, 23<sup>rd</sup> Reprint, 2011.
3. **Computer System Architecture**, M. Morris Mano, Prentice Hall of India Publications, 3<sup>rd</sup> Edition, 8<sup>th</sup> Impression, 2011.



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2019-20

Dr G R DAMODARAN COLLEGE OF SCIENCE (Autonomous), COIMBATORE

B Sc (Computer Science)

Effective from the academic year: 2019-20

**FIRST SEMESTER**

**ALLIED: NUMERICAL AND STATISTICAL METHODS**

(No derivations problems only)

**Objective of the Subject:** The course objective is to teach efficient algorithms for numerical computations, interpolation and extrapolation methods. This paper covers the concepts of Matrices, Numerical methods and Statistics.

**UNIT I:**

**(10 Hrs)**

**Matrices:** Types – Determinant & its properties – Inverse of a matrix – Eigen Values and Eigen vectors – Cay ley's Hamilton theorem.

**UNIT II:**

**(10 Hrs)**

**Numerical Methods:** Systems of simultaneous Linear equations – Gauss elimination Gauss Jordan, Gauss Jacobi Methods. **Numerical integration:** Trapezoidal rule, Simpson's 1/3 & 3/8 rule.

**UNIT III:**

**(10 Hrs)**

**Numerical Interpolation:** Newton's Forward & Backward method – Lagrange's interpolation. **Solution of ordinary differential equations:** Taylor's series, Runge – Kutta method of second and fourth order.

**UNIT IV:**

**(10 Hrs)**

**Measures of central value:** Mean, Median, Mode. **Measures of Dispersions:** Range, Standard Deviation and Variance.

**UNIT V:**

**(10 Hrs)**

**Correlation:** Karl Pearson's Coefficient of Correlation – Rank correlation. **Regression** – Regression equations. **Curve fitting** – method of least squares (Fitting straight lines only).

**TEXT BOOKS**

1. **Numerical Methods In Science & Engineering**, M. K. Venkataraman, National Publishing Company, September 2007, 5<sup>th</sup> Edition.
2. **Statistical Methods**, S.P. Gupta, Sultan Chand & Company Limited, 2014, Revised edition.
3. **Discrete Mathematics for Computer Science & Applications**, P.Radha, T. Santha, 2002, Second Edition.

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2019 - 20

**Dr G R DAMODARAN COLLEGE OF SCIENCE (Autonomous), COIMBATORE**  
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**Effective from the academic year: 2019-20**

**FIRST SEMESTER**  
**CORE: WEB DESIGNING LAB**

**Objective of the Subject:** This paper provides a hands-on experience on working with HTML pages, designing of CSS and embedding CSS with HTML versions 4 and 5.

**With reference to HTML4**

Create HTML Page using the following concepts.

1. Formatting tags
2. Hyperlinks
3. Tables
4. Frames
5. Linking to a segment of a Page. (Fragments)
6. Images and text wrapping around images
7. Lists
8. Templates
9. Forms using basic controls
10. Forms using List controls

Create a CSS to format the following.

11. Links
12. Integration of CSS with HTML

**With reference to HTML 5**

13. Write a HTML5 program to implement Drag and Drop operations
14. Write a HTML5 program to implement any two events.

**Note:**

Develop a project / case study using the above applicable concepts.

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2019-20

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**SECOND SEMESTER**

**CORE: C PROGRAMMING**

**Objective of the subject:** Programming is an essential part of Computer Science. This paper covers the basic aspects of programming starts with the building blocks of a program, taking into consideration the C Language. Concepts like arrays, functions, storage classes, pointers, files and command line arguments are discussed.

**UNIT I:** (10 Hrs)

**Introductory Concepts:** Introduction to C Programming – C Fundamentals: The C Character Set – Identifiers and Keywords – Data Types – Constants – Variables and Arrays – Declarations – Expressions – Statements – Symbolic Constants – Operators and Expressions: Arithmetic Operators – Unary Operators - Relational and Logical Operators – Assignment Operators – The Conditional Operator – Library Functions – Data Input and Output: Getchar and Puchar Function – The scanf function-More About scanf Function - The printf function-More About printf Function – The Gets and Puts Functions

**UNIT II:** (10 Hrs)

**Control Statements:** The If-else, The While, Do-while, For, Nested control structures, Switch, break, The Continue statement- The Comma Operator-The Goto Statement – **Functions:** A Brief Overview - Defining a Functions– Accessing a Function – Function Prototypes -Passing Arguments to a Function – Recursion – String Handling functions.

**UNIT III:** (9 Hrs)

**Program Structure:** Storage Classes – Automatic Variables – External (Global)Variables – Static Variables – **Arrays:** Defining an Array – Processing an Array – Passing Arrays to Functions – **Multidimensional Arrays** – **Strings:** Defining a string-Reading and writing a string-Processing the strings-Searching and sorting of strings

**UNIT IV:** (11 Hrs)

**Pointers - Fundamentals** – Pointer Declarations – Passing Pointers to Function – Pointers and One-Dimensional Arrays – Operations on Pointers – Pointers and Multidimensional Arrays – Arrays of Pointers – Passing Functions to other Functions – More about Pointer Declarations – **Structures & Unions:** Defining a Structure – Processing a Structure – User-Defined Data Types ( Typedef ) – Structures and Pointers – Passing Structures to Functions-Self-Referential structures – Unions

**UNIT V:** (10 Hrs)

**File Handling:** Opening and Closing a Data File – Reading and Writing a Data File – Processing a Data File – Unformatted Data Files –Bitwise Operations- Additional Features of C: Enumeration - Command Line Parameters – Macros – The C Preprocessor.

**TEXT BOOK**

1. Programming with C, Byron S. Gottfried, Tata McGraw Hill, Third Edition,2012
2. Let Us C, Yashawant Kanetkar, BPB Publications, 14<sup>th</sup> Edition, 2016.

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2019 - 20

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**B Sc (Computer Science)**  
**Effective from the academic year: 2019-20**

**SECOND SEMESTER**

**ALLIED: DISCRETE MATHEMATICS**

**Objective of the Subject:** This course is designed to provide an introduction to discrete mathematics. Topics covered include sets, functions, math induction, combinatorics, recurrence, graph theory, trees, and networks.

**UNIT I: (10 Hrs)**

Mathematical Logic: Connective, well-formed formula, tautology equivalence of formulas, tautological implications, duality law. Normal Forms. Theory of inference for statement calculus.

**UNIT II: (10 Hrs)**

Relation and functions: Composition of relations, equivalence of relations – Functions – composition of functions, inverse functions, one-to-one, on-to, one to, one-on-to functions.

**UNIT III: (10 Hrs)**

Formal Languages and Automata: Grammars, phrase-structure grammar, context-sensitive grammar, context-free grammar, regular grammar and finite state automata – conversion of non-deterministic finite automata to finite state automata.

**UNIT IV: (10 Hrs)**

Lattice and Boolean Algebra: Partial ordering, poset, lattices, distributive lattices -complemented distributive lattices – Boolean algebra – Minimization of Boolean function using K-map

**UNIT V: (10 Hrs)**

**(Proving the theorems are exempted for Graphs and Tree)**

Graph Theory: Directed and undirected graphs, connected graphs, path, reachability, circuits, Hamiltonian paths, Euler graphs – Matrix representation of directed and undirected graphs, incidence matrix, and adjacency matrix. Trees - binary tree, expression trees. Traversals of binary trees. Theorems – statements only for both graphs and trees.

**TEXT BOOK**

1. **Discrete Mathematical Structures with Applications to Computer Science**, J.P Tremblay, R P Manohar, Tata McGraw Hill, 38<sup>th</sup> Reprint, 2010.

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BII-08  
2019-20

Subject Code:

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**B Sc (Computer Science)**  
**Effective from the academic year: 2019-20**

**SECOND SEMESTER**

**CORE: DATA STRUCTURES**

**Objective of the subject:** To provide the students with the basic understanding of data structures for more efficient program writing. This paper focuses on various data storage and manipulation structures like arrays, records, stacks, queues, recursion, trees and sorting techniques.

**UNIT I:**

**(12 Hrs)**

Introduction and Overview: Basic terminology – Data structures – Data structure operations .  
Arrays, Records: Linear arrays – Representation of linear arrays – Traversing linear array –  
Inserting and deleting – Linear search – Multidimensional arrays – Records.

**UNIT II:**

**(10 Hrs)**

Sorting: Sorting - Bubble sort – Quick sort – Insertion sort.  
Linked list: Linked lists – Representation in memory – Traversing linked list – Garbage  
collection – Insertion and deletion in linked list - Header linked lists – Two-way lists.

**UNIT III:**

**(10 Hrs)**

Stacks, Queues and Recursion: Stacks – Array representation of stacks – Linked  
representation of stack – Arithmetic expressions – Recursion – Tower of Hanoi – Queue –  
Linked representation of Queues.

**UNIT IV:**

**(8 Hrs)**

Trees: Introduction – Binary trees – Representing binary trees in memory – Traversing binary  
trees – Binary search trees – Searching, Inserting and Deleting in a binary search tree –  
Sorting Techniques.

**UNIT V:**

**(10 Hrs)**

Graphs and Applications: Graph theory terminology – Sequential representation of graph –  
Adjacency matrix – Linked Representation of Graph - Operations on graph – Traversing a  
graph.

**TEXT BOOK**

**1.Data Structures Schaum's Outlines**, Seymour Lipschutz, G.A Vijayalakshmi Pai, Tata  
McGraw-Hill Publishing, 2012,Reprint.

BII-09  
2019-20

Subject Code:

**Dr G R DAMODARAN COLLEGE OF SCIENCE (Autonomous), COIMBATORE**  
**B Sc (Computer Science)**  
**Effective from the academic year: 2019-20**

**SECOND SEMESTER**  
**SKILLED BASED SUBJECT: C PROGRAMMING AND DATA STRUCTURES LAB**

**Objective of the subject:** The main objective is to develop C programming in an Open Source Platform and to provide an introduction of the C programming language emphasizing Data Structure exercises. The course will mainly cover the following topics like General structure and organization of a C program , Basic Components, Arrays and Pointers, Functions, Strings, structures, command line arguments etc.

**C Exercises**

- Operators and expressions
- Ternary operator.
- Control statements
- Functions.
- Arrays.
- Strings
- Pointers.
- Structures.
- Files.
- Command line parameters.

**Data Structures Exercises (Implement the concepts in C)**

- Concepts of Stack
- Queues
- Binary Tree
- Sorting (any two sorting)
- Searching

**Note :**

Develop a project / case study using the above applicable concepts.



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2019-20

Subject Code:

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**B Sc (Computer Science)**  
**Effective from the academic year: 2019-20**

**THIRD SEMESTER**  
**Core: MICROPROCESSORS**

**Objective of the Subject :** The overall objectives is to provide a basic understanding with the basic components of 8086 & 8088 instruction set architecture, inspect and modify 8086 processor registers and memory, write and run basic assembly programs along with 80286 processors.

**UNIT I:**

**(10 Hrs)**

Microprocessors – General Architecture of a Microcomputer system – Reprogrammable and Embedded Microprocessors - Micro architecture of the 8088/8086 Microprocessor – Software model of the 8088/8086 Microprocessor - Memory Address space and Data Organization – Data types – Segment registers and Memory Segmentation – Instruction Pointer – Data registers – Pointer and Index registers – Status Register - MOV Instruction- Addressing modes.

**UNIT II:**

**(10 Hrs)**

Data transfer Instruction: MOV,XCHG instructions – Arithmetic Instructions: Addition of Binary Numbers, ADD,ADC,INC,AAA and DAA- Subtraction of Binary numbers, SUB, SBB, DEC,AAS,DAS and NEG- Multiplication and Division instructions: MUL,DIV, IMUL,IDIV, AAM,AAD,CBW&CWD- Logic instructions : AND,OR,XOR and NOT – Shift instruction: SHL,SHR,SAL&SAR – Rotate Instructions: ROL,ROR,RCL&RCR.

**UNIT III:**

**(10 Hrs)**

Flag control & compare instructions – unconditional and conditional jump – Branch instruction: IF-THEN-ELSE – REPEAT-UNTIL& WHILE-DO – CALL & RETURN – PUSH&POP instructions. 8088&8086 microprocessors: Minimum-mode & Maximum-mode systems – 82C55A PPI – 82C54 programmable Interval timer: Block diagram & Architecture.

**UNIT IV:**

**(10Hrs)**

82C37A Programmable DMA controller: Microprocessor interface of the 82C37A, DMA interface of the 82C37A, Internal Architecture of 82C37A - Programmable communication interface controller: 8251AUSART-Keyboard and display interface. Interrupt mechanism – types& priority – interrupt Vector table – interrupt instructions –enabling/disabling of interrupts – External hardware – interrupt interface signals.

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BIF - 11  
2019-20

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**UNIT V:**

**(10 Hrs)**

80286 microprocessor – Internal architecture – 80386 microprocessor family – internal architecture of 80386DX – 80486 microprocessor family – Internal architecture of 80486 – Pentium processor family: Internal architecture – Pentium Pro Processor and Pentium II – Celeron – Pentium III & Pentium IV. Superscalar Organisation - An Overview.

**TEXT BOOKS**

1. **The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware and Applications**, Walter A.Triebel, Avtar Singh, Pearson Education Ltd., Fourth Edition, Tenth impression,2013.
2. **Modern Processor Design**, John Paul Shen, Waveland Press Inc, 2013.
3. **Microprocessors and Interfacing**, Vaneet Singh, Satyaprakasan Publishers, 2016.

BII-12  
2019-20

Subject Code:

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**B Sc (Computer Science)**

**Effective from the academic year: 2019-20**

**THIRD SEMESTER**

**CORE: OBJECT ORIENTED PROGRAMMING WITH C++**

Objective of the subject: This paper highlights on the basic OOP concept, looping structures, control structures, concept of objects and classes, application of OOPS concepts in programming and functions supported by Object Oriented Programming.

**UNIT I**

(8 Hrs)

Object Oriented Programming-Procedural Languages – The Object oriented Approach – Characteristics of Object oriented programming - Objects – Classes – Inheritance – Reusability – Creating new data types – Polymorphism and Encapsulation.  
Basic Program Construction – Output using cout – Directives – Comments – Integer variables – Character variables – Input with cin – Floating point types – Type bool – Type conversion - Arithmetic operators – Library functions.

**UNIT II**

(10 hrs)

Objects and Classes: A Simple class – C++ Objects as Physical Objects – C++ Objects as Data types – Constructors – Objects as Function arguments – The default Copy constructor – Returning objects from functions – Static class Data – const and Classes.  
Arrays and Strings: Array Fundamentals – Arrays as Class member data – Arrays of Objects – C Strings - The Standard C++ String class.

**UNIT III**

(10 hrs)

Operator Overloading: Overloading unary operators – Overloading binary operators.  
Inheritance: Derived class and Base class – Derived class constructors – Overriding member functions – Scope resolution with overridden functions – Class Hierarchies – Levels of Inheritance – Multiple inheritance – Aggregation.

**UNIT IV**

(12 hrs)

Pointers: Pointers and Addresses – The address-of operator & -Pointers and Arrays – Pointers and Functions – Memory management using new and delete operator – Pointers to Objects-Pointers to pointers.  
Virtual Functions: Virtual Functions – Normal member functions accessed with pointers – Virtual member functions accessed with pointers – Late binding – Abstract classes and Pure virtual functions – Virtual destructors – Virtual base class-Friend Functions.

**UNIT V**

(10 hrs)

Streams and Files : Stream Classes – Disk File I/O with Streams – File Pointers – File I/O with Member Functions – Overloading the Extraction and Insertion operators.  
Templates and Exceptions – Function Templates – Class Templates – Exceptions – Syntax – A Simple Exception Example.

**TEXT BOOKS**

1. Robert Lafore, "Object Oriented Programming in C++", Pearson Education, Sams Publishing Fourth Edition, Sixth Impression, 2011.
2. Marc Gregoire, Nicholas A. Solter, Scott J. Kleper, "Professional C++", Wrox, 2011.

BIF-13  
2019-20

Subject Code:

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**THIRD SEMESTER**  
**Allied: OPERATIONS RESEARCH**  
**(No Derivations; Problems only)**

**Objective of the Subject:** Introduction to operations research, the methodology of mathematical modeling, the decision analysis, and its relation to problems in industrial, commercial, and public systems. The emphasis is on the use of linear mathematical programming including the simplex method, transportation problems, replacement problems, queuing systems etc.

**UNIT I:** (12 Hrs)  
Linear Programming Problem: Mathematical Formulation of the problem – Graphical Solution Method - Simplex method - Big-M method –Dual Simplex Method.

**UNIT II:** (10 Hrs)  
Transportation Problem: Introduction – Finding an Initial basic feasible solution (North – West Corner Method, Least-Cost Method & Vogel's Approximation Method) – Test for Optimality. Assignment Problem: Introduction - Hungarian Method.

**UNIT III:** (10 Hrs)  
Inventory Control: Introduction – Objectives of scientific inventory control - Various costs involved in inventory – Deterministic Inventory Problem with and without shortages – Problem of EOQ with price breaks.

**UNIT IV:** (8 Hrs)  
Queuing Theory: Introduction – Queueing system – Elements of a queueing system – Operating characteristics of a queueing system- Poisson queueing systems-  $\{(M/M/1):(\infty/FIFO)\}$  and  $\{(M/M/1):(N/ FIFO)\}$ .

**UNIT V:** (10Hrs)  
Games and Strategies: Introduction – Two-Person Zero-Sum games – Some basic terms – The Maximin- Minimax Principle – Games without saddle point-Mixed Strategies – Graphic Solution of  $2 \times n$  and  $m \times 2$  games.  
Network Scheduling by PERT/CPM: Network: Basic Components – Rules of network construction –Critical path analysis: Forward & Backward Pass Calculations.  
PERT Calculations.

**TEXT BOOKS**

1. **Operations Research**, Kanti Swarup, P.K.Gupta, Manmohan, Sultan Chand & Sons, 2012, 16th Edition.
2. **Problems in Operations Research**, P.K. Gupta, Dr.D.S.Hira, S. Chand & Company, Reprint 2010.

BTL-14  
2019-20

Subject Code:

**Dr G R DAMODARAN COLLEGE OF SCIENCE (Autonomous), COIMBATORE**  
**B Sc (Computer Science)**  
**Effective from the academic year: 2019-20**

**THIRD SEMESTER**

**CORE: C++ PROGRAMMING LAB**

**Objective of the subject:** The main objective is to develop C++ programming in an Open Source Platform.. The goals of this course are to introduce students the C++ Programming Languages concept including data types, operators, control structures, arrays and parameter passing. It also gives a hands-on experience on implementing the OOPS concepts like overloading, virtual function, inheritance, files, exception handling and template concepts.

Develop programs using the following concepts:

1. Class and Objects
2. Arrays
3. Functions
  - i) Friend
  - ii) Inline
  - iii) Recursive
  - iv) Virtual
4. Constructors, Destructors and the types of Constructors
5. Overloading concepts.
  - i) Function Overloading
  - ii) Operator Overloading
6. Inheritance
7. Dynamic memory management using new, delete operators.
8. Pointers
9. Templates
10. Exception Handling
11. Files

Develop a project / case study using the above applicable concepts.

BII-15  
2019-20

Subject Code:

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**Effective from the academic year: 2019-20**

**FOURTH SEMESTER**

**CORE: DATABASE MANAGEMENT SYSTEM**

**Objective of the subject:** This course is an introductory course on database management systems. The course deals with the notion of database systems from the user point of view and to introduce the fundamental concepts of database systems, acquaint the students with the use of current database systems and build a solid foundation for advanced studies in database area.

**UNIT I:**

**(8 Hrs)**

Introduction: Database System Applications- Purpose of Database systems- View of Data – Database Languages – Database Architecture - Database Users and Administrator. Data Models: Types of Data Models.

**UNIT II:**

**(10 Hrs)**

Database design and the E-R model: The Entity Relationship model – Constraints – Removing Redundant attributes in Entity sets - E-R diagram. Introduction to the Relational model: Structure of Relational Databases – Database Schema – Keys – Relational Query Languages - Relational operations.

**UNIT III:**

**(10 Hrs)**

Relational database design: Features of good relational designs – Atomic domains and First Normal Form – Decomposition using functional dependencies – Functional dependency theory – Decomposition using multivalued dependencies.

**UNIT IV:**

**(12 Hrs)**

Overview of NoSQL : NoSQL Databases – About NoSQL – Difference between RDBMS and NoSQL – Benefits of NoSQL Database – Types of NoSQL database. MongoDB: Overview of MongoDB – Advantages of MongoDB over RDBMS- MongoDB Data Types - Creating and deleting database – Creation, Inserting, Update, Deleting the documents.

**UNIT V:**

**(10 Hrs)**

MySQL: Brief History of MySQL – SQL Statements - DDL – DML – Subqueries – Unions – Joins – Aggregate functions – Groupings - View and Trigger.

**TEXT BOOKS**

1. **Database System Concepts**, Henry F.Korth, Abraham Silberschatz, & S. Sudarshan, Tata McGraw-Hill Publishing Company, 6<sup>th</sup> Edition, 2011.
2. **Database Systems Using Oracle**, Nilesh Shah, PHI Learning Pvt. Ltd, 2<sup>nd</sup> edition, 2005.
3. **MongoDB: The Definitive Guide**, Kristina Chodorow, O'Reilly Media Publisher, 2<sup>nd</sup> Edition, 2013.
4. **NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence**, Pramod J. Sadalage, Martin Fowler, 1st Kindle Edition, 2014.
5. **Murach's MySQL**, Joel Murach, 2<sup>nd</sup> Edition, 2012.

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FOURTH SEMESTER  
CORE: PYTHON PROGRAMMING

**Objective of the subject:** The focus of the course is to provide students with an introduction to programming, install and run the Python interpreter - I/O – Tuples – Class and Object – Files using the Python programming language.

**Unit I** (10 Hrs)

**Introduction to Python:** Overview – History of Python – Python features – **Environment** - Environment setup – Getting Python – Install Python – Setting up Path – Running Python – **Basic Syntax** – Hello World – Interactive mode programming – Script mode Programming – A simple Python example.

**Unit II** (10 Hrs)

**Programming Basics of Python:** Python Keywords – Identifiers – Rules for writing Identifiers – Reserved words – Lines and Indentation – Multiline statements – Python Variable – Variable Assignment – Multiple Assignment - **Standard Data Types:** Numbers: int, float and decimal – **Basic Operators:** Arithmetic Operators – Comparison (Relational) Operators – Assignment Operators – Logical Operators – Bitwise Operators – Membership Operators – Identity Operators – **Loops:** Types of loops – while – for Loops – **Control statements:** if ...else – for loop – break and continue.

**Unit III** (10 Hrs)

**Programming with Python: Functions:** Introduction – Using a Function - Communicating with Functions – Example of creating a simple calculator using functions – **Lists:** Accessing values in Lists – Updating Lists – Delete List elements – Built-in Lists functions & Methods – **Tuples:** Creating Tuples – Accessing Tuples – Updating Tuples – Deleting Tuples – Basic Tuple operations - Built-in Tuple functions – **Dictionary:** Access, Update and Delete dictionary elements – Built-in Dictionary Functions & Methods.

**Unit IV** (10 Hrs)

**Object Oriented Programming: Classes and Objects:** Creating a Class – Using a Class – Constructor, class attributes and destructors - Inheritance - A simple Inheritance – Multiple Inheritance, overlapping and overloading operators **Exception Handling:** Try, Except and Finally.

**Unit V** (10 Hrs)

**Advanced Concepts: Files I/O:** Opening a file – Seek and Find a file – Other I/O functions - **Database and SQL:** Database – SQLDB – Database connection Parameters – Insert, Update, Delete – **Sending Mail:** SMTP protocol – Syntax – Sending Email using Python.

**TEXT BOOKS:**

1. Python for Everybody, Exploring Data Using Python, Charles Severance, kindle Publication, 2016.
2. Python: Programming For Beginners: Learn The Fundamentals of Python in 7 Days Kindle Edition, 2012.
3. www.udemy.com

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**FOURTH SEMESTER**  
**ALLIED: PRINCIPLES OF MANAGEMENT**

**Objective of the subject:** This course will give an overview of the various functions of an Organization. It will give an insight into the activities of and various roles and responsibilities of various functional level managers.

**UNIT I:** (10 Hrs)  
Definition of Management - Science or Art - Management and Administration - Development of Management Thought - Types of Business Organization.

**UNIT II:** (10 Hrs)  
Purpose of Planning - Steps in Planning - - Setting Objectives - Managing by Objectives - Forecasting - Strategies - Policies - Decision-making.

**UNIT III:** (10 Hrs)  
Organising - Nature and Purpose - Structure - Formal and informal - Line and Staff authority - Centralization Vs Decentralization - Authority Vs Responsibility - Staffing - Selection - Managerial Effectiveness.

**UNIT IV:** (10 Hrs)  
Directing - Scope - Objectives. Leadership - Types of Leadership. Motivation - Hierarchy of needs - Motivation theories - Motivational Techniques - Job Enrichment - Communication - Process of Communication - Barriers and Breakdown - Effective Communication - Electronic media in Communication

**UNIT V:** (10 Hrs)  
System and process of Controlling - Requirements for effective control - The Budget as Control Technique - Information Technology in Controlling - Use of computers in handling the information - Productivity - Problems and Management - Control of Overall Performance - Direct and Preventive Control - Reporting

**TEXT BOOKS**

1. **Essentials of Management**, Harold Kooritz & Heinz Weihrich, Tata McGraw-Hill, 8<sup>th</sup> Edition, 2011.
2. **Essentials of Management**, Joseph L Massie, Prentice Hall of India, (Pearson) Fourth Edition, 2010.
3. **Principles of Management**, Tripathy PC And Reddy PN, Tata McGraw-Hill, 5<sup>th</sup> reprint 2012.
4. **Personnel and Human Resources Management**, Decenzo David, Robbin Stephen A, Prentice Hall of India, 10<sup>th</sup> Edition, 2011

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**Dr G R DAMODARAN COLLEGE OF SCIENCE (Autonomous), COIMBATORE**  
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**Effective from the academic year: 2019-20**

**FOURTH SEMESTER**

**Skill Based Subject: Python and DBMS Lab**

**Objective of the Subject:** The course provides hands-on experience to develop simple applications Python Programming. It also provides experience for manipulation of data at back end such as creating tables, exceptions, triggers, procedures and cursors in an open source platform.

**Python Exercises**

1. Install and execute python interpreter
2. String functions
3. Binary functions
4. Looping and Control Statements
5. Functions
6. Lists
7. Tuples
8. Dictionaries
9. File Handling

**MySQL Exercises**

1. Table Creation and Inserting Values.
2. Queries using DDL and DML Commands.
3. Aggregate functions
4. Join
5. Trigger.
6. Views
7. Procedures

**MongoDB**

1. Collections
2. Documents

**Note:**

Develop a project / case study using the above applicable concepts.



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**FIFTH SEMESTER**

**CORE: CYBER SECURITY**

**Objective of the subject:** This paper helps the students to understand the different types of Threats, Cyber Crimes, Cyber Risks and also discusses on the necessity of Threat Intelligence for a better Cyber Management and supportive Architecture.

**UNIT I**

**(10 Hrs)**

**Cyber Threats:** Cyber Security and its importance-Cyber Threats -Organized Crime - Proliferation of Weapons of Mass Destruction- Background, Sources and Types of Cyber Threats- Potential Risk factors of Cyber Threats- **Cyber Crime:** Overview-Origin and evolution of Cyber Crime-Criminalization-Cyber Crime Classifications-Conducting Cyber Investigations-Economical crisis - Challenges faced in Cyber Crimes.

**UNIT II**

**(8 Hrs)**

**Cyber Threat Intelligence-** An Overview of Threat Intelligence- Key Characteristics- Need for Threat Intelligence- Impact of Threat Intelligence-Applicability of Threat Intelligence. Threat Detection Rules -Risk Reduction through Threat Intelligence – Understanding and Implementing Threat Intelligence.

**UNIT III**

**(11 Hrs)**

**Cyber Management** -Cyber Risk- Analyzing and Managing Cyber Risks- Risk Management Principles: Principles of Risk Management-Risk Management Process- Dealing with Risks- Risk Analysis - Evaluating cyber risks: Assessing the IT security- Quantifying the Risks- Evaluation of the existing Insurance Policies-Improve security and overall Risk Strategy- **Prepare your organization- Coverage Review-** Benefits of Risk Management- Cyber Risk Management Frameworks-Governance of Cyber Security Risks.

**UNIT IV**

**(11 Hrs)**

**Cyber Security Challenges** –Fundamentals-Evolution-Strategic Cyber Security-Preventing Cyber Attacks-Methods of Securing Next Generation Internet Services. **Cyber Security Architecture-** Planning, Design and Implementation Issues of Security Architecture- Implementation Issues of the Security Architecture- Global Architectural Approach- Multifaceted Cyber Security.

**UNIT V**

**(10 Hrs)**

**Cyber Defense Mechanisms-** Cyber Self Defense- Cyber Attack Techniques and Defense Mechanisms- Cyber Defense Planning Model- Cyber Supply Chain Security- DDOS Attacks and Cyber Defense: Securing Industrial Control Systems - Case Studies on Cyber Crime in Indian Perspective.

**TEXT BOOK**

1. Combating Cyber Threats through Cyber Security Intelligence, Dr.S.Sujatha, Dr.N.Sudha Bhuvanewari, Kalaikathir Publications, 2017.

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**Dr G R DAMODARAN COLLEGE OF SCIENCE (Autonomous), COIMBATORE**  
**B Sc (Computer Science)**  
**Effective from the academic year: 2019-20**

**FIFTH SEMESTER**

**CORE: JAVA PROGRAMMING**

**Objective of the subject:** This paper aims to learn the Java programming language along with its syntax, idioms, patterns, and styles. To understand object oriented programming and to learn the essentials of the Java class library and event driven Graphical User Interface (GUI) programming. OOPS, branching statements, classes, constructor, and inheritance, static classes, abstract classes, packages, string handling, multithreading and applets.

**UNIT I**

**(9 Hrs)**

Java Programming Techniques – Lexical issues – Variables – Types – Arrays – Operators. Branching: If-else, break, switch, return statements – Looping: while, do-while, for, comma statements, continue.

**UNIT II**

**(9 Hrs)**

Classes: Object references – Instance Variables – New operator- Dot operator – Method declaration – Method calling – this operator – Constructors – Method overloading – Inheritance – Super class – Method overriding – Dynamic method dispatch – final, finalize, static, Abstract classes.

**UNIT III**

**(10 Hrs)**

Packages and Interfaces: Packages: The package statement – Compiling classes in packages - The import statement – Access protection. Interface: The interface statement – The implements statement – Variables in interfaces.

String handling: Constructors – String creation – String Concatenation – Character Extraction, Comparison.

**UNIT IV**

**(12 Hrs)**

Exception handling fundamentals: Exception type – Uncaught Exceptions – Nested try statements – The Java thread model – Thread Priorities, Synchronization, Messaging – Thread – Runnable – Inter Thread communication – Thread API Summary. File Handling – - java.io package - I/O Stream classes.

**UNIT V**

**(10 Hrs)**

Applets: HTML applet tags – Order of Applet initialization – Sizing graphics – Simple graphics – Color methods – Fonts – Multi-line Text Alignment – Abstract Window Toolkit: Components – Layout – Menu Components – Event.

**TEXT BOOK**

1. **The Java Handbook** , Patrick Naughton, Tata McGraw Hill, 2008.
2. **Java 9 for Programmers**, Paul J.Deitel, Harvey Deitel, Prentice Hall, 4<sup>th</sup> Ed, 2017.

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**FIFTH SEMESTER**

**CORE: OPERATING SYSTEMS**

**Objective of the Subject:** The objective is to emphasize the need and the functionality of the operating system, to discuss the components and responsibilities of the operating systems like storage management, process management and device management. The implementation of these concepts in DOS operating system are also discussed.

**UNIT I:** **(10 Hrs)**  
Introduction and process concepts: Definition of OS - Definition of process – Process states, lifecycle of process – process management  
Asynchronous Concurrent Execution: Mutual Exclusion – Implementing Mutual Exclusion Primitives – software solution to the Mutual Exclusion Problem- Semaphores

**UNIT II:** **(10 Hrs)**  
Deadlock and Indefinite Postponement: Introduction – Examples – Related Problem – Resource concepts – Four Necessary conditions for Deadlock – Deadlock solutions – deadlock prevention – deadlock avoidance – detection –recovery – deadlock strategy in current and future systems.

**UNIT III:** **(10 Hrs)**  
Processor Scheduling: Preemptive Vs Nonpreemptive scheduling –priorities - Scheduling objectives – scheduling criteria - Scheduling algorithms – deadline scheduling

**UNIT IV:** **(10 Hrs)**  
Real Memory Organization and Management: Introduction – Memory Organization – Memory Management – Hierarchy – Memory Management Strategies – Contiguous Vs Non contiguous memory allocation – Single user contiguous memory allocation – Fixed partition multiprogramming – variable partition multiprogramming – Paging

**UNIT V:** **(10 Hrs)**  
Virtual Memory Management: Demand Paging –anticipatory paging - Page Replacement – page replacement strategies – page fault – page size  
Disk performance Optimization – Necessity of Disk Scheduling – Disk Scheduling Strategies – A Case study on a Mobile Operating System.

**TEXT BOOKS**

1. **Operating System**, Deital Deital Choffnes, Pearson Education, First Edition, 2009.
2. **An Introduction to Operating System**, H.M.Deital, Addison Wesley, Second Edition, reprint 2006.
3. **Modern Operating Systems**: Global Edition, Andrew S Tanenbaum, Herbert Bos , Pearson Publishers, 4<sup>th</sup> Ed, 2015.



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**FIFTH SEMESTER**  
**CORE: SOFTWARE ENGINEERING**

**Objective of the Subject:**

This paper highlights the fundamentals of software engineering, planning a software project, software cost estimation, software requirements, software design, software verification and validation, and software maintenance.

**Unit – I (10 Hours)**

**Introduction to Software Engineering:** Some Definitions – Some Size factors – Quality and Productivity Factors – Managerial Issues. **Planning a Software Project:** Defining the Problem – Developing a Solution Strategy – Planning the Development Process – Planning an Organizational Structure – Other Planning Activities.

**Unit – II (10 Hours)**

**Software Cost Estimation:** Software Cost Factors – Software Cost Estimation Techniques – Staffing-Level Estimation – Estimating Software Maintenance Costs.

**Unit – III (8 Hours)**

**Software Requirements Definitions:** The Software Requirements Specification – Formal Specification Techniques – Languages and Processors for Requirements Specification: structured Analysis and Design Technique(SADT) – Structured System Analysis(SSA)

**Unit – IV (10 Hours)**

**Software Testing:** Testing fundamentals: Introduction-Basic definition-Software testing principles- Tester's role. Defect, Hypotheses and Test: Origins of defects. White Box Testing: Introduction- Static testing- Structural Testing- Challenges.

**Unit – V (12 Hours)**

**Black Box Testing:** Introduction-Need –Time for doing black box testing. Integration Testing: Integration Testing as a type of testing-As a phase of testing. System and Acceptance Testing: System testing overview- Need for system testing- Functional and Non functional testing

**Text Books**

1. Software Engineering Concepts, Richard Fairley, Tata McGraw Hill, 2008, 30<sup>th</sup> Reprint
2. **Practical Software Testing**, Ilene Burnstein, Springer Publication, 13<sup>th</sup> Indian reprint, 2013.
3. **Software Testing Principles and Practices**, Srinivasan Desikan and Gopalaswamy Ramesh, Pearson Publication , Reprint 2011.
4. Software Engineering –A Practitioner's Approach. Roger S. Pressman, Tata McGraHall Edition. Tenth Edition, 2013.

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**FIFTH SEMESTER**  
**ELECTIVE I: AUGMENTED REALITY**

**Objective of the Subject:** This paper sets the stage by presenting a working definition of augmented reality, providing various application examples of this powerful real world user interface technology.

**Unit I:** (10 Hrs)  
Introduction to Augmented reality – Definition and scope – A brief history of Augmented Reality – Examples- Related fields

**Unit II:** (10 Hrs)  
Displays – Multimodal Displays – Visual Perception – Requirements and Characteristics – Method of Augmentation – Ocularity and Stereoscopy - Focus – Occlusion.

**Unit III:** (10 Hrs)  
Tracking, Calibration and Registration – Coordinate Systems – Characteristics of Tracking Technology – Mobile sensors – Optical tracking.

**Unit IV:** (10 Hrs)  
Computer vision for Augmented Reality: Marker Tracking – Multiple camera Infrared Tracking – Incremental tracking – Simultaneous Localization and Mapping – Outdoor tracking

**Unit V:** (10 Hrs)  
Calibration and Registration: Camera Calibration – Display Calibration – Registration – Situated Visualization – Challenges – Visualization Registration – Annotations and Labeling – X – Ray Visualization.

**TEXT BOOKS:**

1. **Augmented Reality Principles and Practice**, Dieter Schmalstieg, Tobias Hollerer, Addison Wesley, 2016.

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**FIFTH SEMESTER**  
**ELECTIVE I: BIG DATA ANALYTICS**

**Objective of the Subject:** This paper gives an overview about Big data and introduces the technology behind it. The paper also concentrates on the recent technologies available in the market dealing with big data. The case study covered in the syllabus gives students an awareness and better understanding about big data.

**UNIT- I**

**(10 Hrs)**

Introduction to Big Data-Characteristics of Big Data- The volume of Data- the Variety- the Velocity of Data- Data in the Warehouse and Data in Hadoop.  
Importance of Big Data – When to consider a Big Data Solution- Big Data Use cases: Patterns for Big Data Deployment- IT for IT Log Analytics.

**UNIT-II**

**(10 Hrs)**

Big Data: From the Technology Perspective-All about Hadoop: The Big Data Lingo  
Chapter- The history of Hadoop- Components of Hadoop- Application Development in Hadoop-Getting your data into Hadoop- Other Hadoop Components.

**UNIT- III**

**(10 Hrs)**

Hadoop- Integrated Hadoop System- Analytical Databases with Hadoop Connectivity- Hadoop-Centered Companies. Big Data in the Cloud: IaaS And Private Clouds-Platform Solutions-Big Data Cloud platforms compared.

**UNIT-IV**

**(10 Hrs)**

The NoSQL Movement: Size, Response, Availability-Changing Data and Cheap Launches- The sacred Cows-other features. The Future of Big Data: More Powerful and expressive tools for Analysis- Streaming Data Processing- Rise of Data Marketplaces- Development of Data Science Workflows and Tools- Increased Understanding of and Demand for Visualization.

**UNIT- V**

**( 10 Hrs)**

Big Data Analytics in Internet Banking, Manufacturing, Telecommunication, Healthcare sector and E-commerce.

**TEXT BOOKS**

1. **Understanding Big Data, Analytics for Enterprise Class Hadoop and Streaming Data**, Chris Eaton, Dirk Deroos, Tom Deutsch, George Lapis, Paul Zikopoulos, Tata Mc Graw Hill, 2012 Edition. (ebook) (Unit-I and II) (Refer e-book repository)
2. **Planning for Big Data**, O'Reilly Radar Team, 2012.(ebook) (Unit III and IV) (Refer e-book repository)

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**Effective from the academic year: 2019-20**

**FIFTH SEMESTER**  
**ELECTIVE I: OPEN SOURCE SOFTWARE**

**Objective of the subject:** This paper focuses on open source systems. It also orients developing application with an open source scripting application like PHP in the front end and an open source backend like MySQL.

**UNIT I**

**(8 Hrs)**

Open Source – Definition of Terms – Open Source Operating systems – Contents – Linux distribution – Open Source Desktop applications – Introduction – Graphical Desktops – Web browsers – The Open Office Suite.

**UNIT II**

**(8 Hrs)**

MySql Data types – Working with Database and Tables: Creating Databases, Selecting Database for use – Deleting Databases – Creating Tables – Copying Tables – Modifying Tables – Deleting Tables. Working with Data: Inserting, updating and deleting records – Retrieving records – Copying, Importing and Exporting records – Subqueries.

**UNIT III**

**(12 Hrs)**

PHP- Overview- Writing PHP Programs: Example program-Viewing a web page-Serverside scripting-caching-variables-Getting Data from the Client: Web forms-Decision making: Conditional or Branching statements- Form Validation- Loops and Arrays.

**UNIT IV**

**(10 Hrs)**

Organising codes: Code reuse- Functions- Scope of functions-Nesting-Include files. Objects : File and directory Handling: Working with files –Working with directories- uploading files.

**UNIT V**

**(12 Hrs)**

Retrieving data from MySQL using PHP: Retrieving data using PHP- SQL statements fro Retrieving data. Manipulating Data in MySQL using PHP: Update- delete records- Date and Time Type fields- Getting information on database tables. PHP Database Connectivity: PHP MySQL Connectivity

**TEXT BOOKS**

1. **Open Source Software**, Paul Kavanagh, Elsevier Digital Press, 2004, 1<sup>st</sup> Edition. (Unit I)
2. **MySQL: The Complete Reference**, Vikram Vaswani, Tata McGraw Hill, 2004. (Unit II)
3. **Beginning PHP4**, Wankyu Choi, Allan Kent, Chris Lea, Ganesh Prasad, Chris Ullman with Jon Blank, Sean Cazzell, Shroff Publishers and Distributors Pvt.Ltd, 2000.( Unit III, IV, V)

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**FIFTH SEMESTER**

**ELECTIVE I: EMBEDDED SYSTEM AND ITS APPLICATIONS**

**Objective:** This paper introduces basic electronics, highlights on microcontrollers and embedded systems, robotics and its applications.

**UNIT I** (10 HRS)  
Basic Electronics: Components and Devices: Capacitors – Resistors – Transistors – Diodes – LEDs - Breadboard – AC Motors – DC Motors - Servo Motors - Measuring Instruments – Circuits – Power Units

**UNIT II** (10 HRS)  
Introduction to Microcontrollers and Embedded Systems: Introduction to PCB – Microprocessors Vs Microcontrollers – Types of Microcontrollers, Advanced Microcontroller Chips: ATMega, Atmel - Arduino IDE

**UNIT III** (10 HRS)  
Fundamentals of Sensors – Types - functional characteristics of sensors – IR Sensors – Temperature Sensors – Light Sensors - Actuators – Sensors and actuators for Biosciences – Tactile Sensors – Strain gauges - UAV flight control system, Applications of Embedded systems in Air surveillance.

**UNIT IV** (10 HRS)  
Introduction to Robots – Types of Robots – Operating Principles and functions – Black Line follower robot – Edge detector robot – Obstacle sensing – Automation of Traffic signals.

**UNIT V** (10 HRS)  
Applications: Robotics applications in Agriculture, Biotechnology, Information and Communication Technology, Navigation.

**Reference Books**

1. V.K.Mehta, “Basic Electronics”, S Chand & Co,
2. Arduino Tutorial: <http://www.ladyada.net/learn/arduino/>

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**FIFTH SEMESTER**

**ELECTIVE I: AIR AND SEA NAVIGATION**

**Objective of the Subject:** This course is designed to introduce the computing technologies used for Air and Sea Navigation. The fundamentals, key terms and equipments used for the navigations purposes are discussed.

**UNIT I:** (10 Hrs)  
Air Navigation: Navigation Aids – Distance Measuring Equipments (DME) – LORAN - Doppler RADAR – GPS. Aeronautical lighting and other Airport Visual Aids: Approach Light Systems – Runway Edge Light Systems – Control of Lighting Systems - Air Space: General Dimensions of Airspace Segments – Transient Speed Control-Descent gradient - Wind Direction. Air Traffic Control: Air Route Traffic Control Centers – Control Towers.

**UNIT II:** (10 Hrs)  
Emergency Procedures: Pilot Responsibility and Authority -Emergency Conditions –Distress Signals – Safety of the Flight: Weather Observing Program – Medical Facts for Pilots: Fitness for flight – Vision in flight –Dynamics of the Helicopter - Helicopter Operations: Helicopter Flight control systems.

**UNIT III:** (10 Hrs)  
Fundamentals: Introduction to Marine Navigation – Nautical Charts: Chart fundamentals – Piloting: Definition and Purpose - Preparation – Transition to Piloting - Short Range aids to Navigation: Fixed Lights – Light Characteristics – Buoyage Systems – Compasses – Magnetism Compasses - Tides and Tidal Currents: Origins of Tides – Features of Tides

**UNIT IV:** (10 Hrs)  
Emergency Navigations: Basic Techniques -Navigation Regulations: Ship Routing – Avoiding rock collisions - Maritime Safety Systems - Global Maritime Distress and Safety System - Distress Signals. Hydrography: Basics of Hydrographic Surveying. Weather Elements: General Description of the Atmosphere.

**UNIT V:** (10 Hrs)  
Satellite Navigation: The Global Position System – LORAN Navigation: Introduction to LORAN – LORAN Description – RADAR Navigation: Principles of RADAR operations. Navigational Astronomy: The Universe – AZIMUTHS and AMPLITUDES

**TEXT BOOKS**

1. Nathaniel Bowditch, LL.D, “The American Practical Navigator : The Epitome of Navigation”, The National Imagery and Mapping Agency, 2002.
2. Jim Doherty, “Maritime Navigation”, Trieste, Italy, 2010(Online Tutorial)
3. Professor Dr. Paul Stephen Dempsey, Director, Institute of Air & Space. “Air Navigation”, McGill University, [www.iasl.mcgill.ca](http://www.iasl.mcgill.ca) (online Tutorial)
4. Aeronautical Information Manual, Official Guide to Basic Flight Information and ATC Procedures, US Department of Transportation, Federal Aviation Administration, 2017.

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**FIFTH SEMESTER**

**CORE: JAVA PROGRAMMING LAB**

**Objective of the Subject:** The main objective is to develop Java programming in an Open Source Platform. This paper provides a hands-on experience in developing websites, basic OOPS concepts, applets, packages, multi-threading, exceptions, interface.

Develop a Java Program for the following concepts:

1. Classes and objects.
2. Arrays.
3. Thread.
4. Exception handling.
5. Inheritance.
6. Interfaces
7. User defined Packages
8. String Operations
9. Applets.
10. File Handling – I/O Stream Classes
11. AWT Controls & Event handling

**Note:**

Develop a project / case study using the above applicable concepts.



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**FIFTH SEMESTER**

**SKILL BASED SUBJECT: APTITUDE**

**Objective of the subject:** This subject highlights on improving the aptitude ability of the student and to understand technical and logical work outs like ratio and proportion, Profit and Loss, Probability, C Programming and OOPS concepts.

**UNIT I:**

**(6 Hrs)**

Operation on numbers: Introduction -Face value -Place value - BODMAS rule. Ratio and Proportion: Ratio -Proportion- Indices - Logarithms - Average - Simple Problems.

**UNIT II:**

**(6 Hrs)**

Problems on Ages: Problems on Ages - Clocks and Calendars - Mixtures and Alligations - Time and Work - Time and Distance. Profit and loss: Introduction - Cost price - Selling price - Profit and loss - Simple Problems.

**UNIT III:**

**(6 Hrs)**

Statistical description of data: Textual - Tabular and Diagrammatic representation of data - Data Sufficiency - Probability: Concept of percentage - Probability - Simple Problems

**UNIT IV:**

**(6 Hrs)**

Problem Solving techniques in C - Data types - Type casting - Bitwise Operators - Arithmetic expressions, Relational Operators - Logical Expressions - Functions and Parameter Passing by Value - Passing Arrays to Functions, Call by value - Call by Reference - Recursion -Structures and Pointers.

Object Oriented C++ - Classes - Objects - Object oriented Paradigms: Data Abstraction - Encapsulation - Inheritance - Polymorphism - Abstract Classes - Virtual classes

**UNIT V:**

**(6 Hrs)**

Java: Language Fundamentals, Operators and Assignments, Exceptions, Inner Classes, Garbage Collections, Java Packages, Inheritance, Interfaces, Java.util class, Java.io class, Threads.

Python: variables, expressions, math function, Function calls, Type conversion functions, Parameters and arguments, Debugging, Conditionals and recursion, Lists, Dictionaries, Strings, Tuples, files, Classes and Objects

**TEXT BOOKS**

1. **Quantitative Aptitude**, R.S.Aggarwal, S. Chand, 20th edition, 2013.
2. **Quick Arithmetic**, Ashish Aggarwal, S. Chand & Company Ltd, 2007.
3. **C Programs with Solutions**, S.Anadhamurugan, University Science Press, First Edition, 2011
4. **Let us C++**, Kanetkar, Yashavant P, BPB Publications, 2010.
5. Herbert Schildt, "**The Java Complete Reference**", Tata McGrawHill, Publishers, 7<sup>th</sup> Edition, 2007.
6. Allen Downey, "**Think Python**", 2<sup>nd</sup> Edition, Green Tea Press, Massachusetts, 2012.

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Subject Code:

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**SIXTH SEMESTER**

**CORE: COMPUTER NETWORKS**

**Objective of the subject:** This paper focuses on the reference models, issues of different layers of the OSI reference model layers and underwater networking concepts. This subject helps in understanding the concepts of **Computer Network Engineering and Underwater Networks**.

**UNIT I:** (10 Hrs)

Introduction: Use of computer networks – Network Hardware – PAN, LAN, MAN WAN, Internetworks – Network software- Protocol hierarchies – Design issues for the layers – Connection-Oriented versus Connectionless Service – Service Primitives – Reference models - the OSI reference model – the TCP/IP reference model. Types of networks: Wireless and mobile networks.

Network Ports: Connectors – Switch – Jack. Switching systems: Circuit switching – message switching – Packet switching- Network Boosters. Critical areas of the Network: Security – Traffic Management – Real-Time monitoring – Scalability

**UNIT II:** (10 Hrs)

The Physical Layer: Transmission Media – Wireless transmission – Communication satellites. Data link layer: Data link layer design issues – Error detection and correction – Elementary data link protocols – Sliding window protocols.

**UNIT III:** (10 Hrs)

Network Layer: Network layer design issues - Routing algorithms – The optimality principle – Shortest path routing – Flooding – Distance vector routing. Transport layer: The transport service – Elements of transport protocol. Application Layer: Domain Name System – The DNS Name space – Domain resource records – Name servers- The world wide web.

**UNIT IV:** (10 Hrs)

Introduction: Underwater Networking – Underwater Networking Architecture - Types of Cables - Modems - Protocols - Operating System - Monitoring systems. Network monitoring: deployment – relocation - recovery

**UNIT V:** (10 Hrs)

Applications of Underwater Networking: Autonomous underwater vehicles (AUVs) – Sea level temperature - Storm identification – Heading - storm's intensity, hail probabilities – Hail Size - causes of a Tsunami – timing and intensity – centre of the Tsunami - direction.

**TEXT BOOKS:**

1. Computer Networks, Andrew S. Tanenbaum & David J. Wetherall, Pearson Education, 2012, 5<sup>th</sup> Edition.
2. Data and Computer Communications, William Stallings, Prentice Hall of India, 2007, 8th Edition.
3. Robert J. Urick, Principles of Underwater Sound, Peninsula Publication, Third Edition, 1996
4. Ask T., Handbook of Marine Surveying, Sheridan House, 2007.
5. Web References

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Subject Code:

**Dr G R DAMODARAN COLLEGE OF SCIENCE (Autonomous), COIMBATORE**  
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**Effective from the academic year: 2019-20**

**SIXTH SEMESTER**

**CORE: WEB TECHNOLOGY**

**Objective of the subject:** This paper includes basics of .NET Framework, developing dynamic web applications using the Web controls, rich web controls and ADO.NET.

**UNIT I**

**(10 Hrs)**

Introducing the .NET Framework: The Evolution of Web Development – The .NET Framework - .NET Languages – The Common Language Runtime - .NET Class Library. Developing ASP.NET Applications – Visual Studio: Creating Websites- Designing a Web page- The anatomy of a Web Form – Writing Code – Visual Studio Debugging. Web Form Fundamentals: The anatomy of an ASP.NET Application – Introducing Server Controls – HTML Control Classes – The Page Class – Application Events – ASP.NET Configuration.

**UNIT II**

**(10 Hrs)**

Web Controls: Stepping Up to Web Controls – Web Control Classes – List Controls – Table Controls – Web Control Events and AutoPostBack – A Simple Web page. State Management: The problem of State – View State – Transferring Information between Pages – Cookies – Session State – Session State Configuration – Application State – An Overview of State Management Choices.

**UNIT III**

**(10 Hrs)**

Building Better Web Forms - Validation: Understanding Validation – The Validation Controls. Rich Controls: The Calendar – The AdRotator – Pages with Multiple Views. Website Navigation: Site Maps – The SiteMapPath Control – The Tree View Control – The Menu Control.

**UNIT IV**

**(10 Hrs)**

ADO.NET Fundamentals: Understanding Databases – Configuring the Database – SQL Basics –The DataProvider Model – Direct Data Access – Disconnected Data Access. Data Binding: Introducing Data Binding – Single-Value Data Binding – Repeated-Value Data Binding.

**UNIT V**

**(10 Hrs)**

Data Source Controls. The Data Controls : The GridView – Formatting the GridView – Selecting a GridView Row – Editing with the GridView – Sorting and Paging the GridView – The DetailsView and FormView. Putting MVC into ASP .NET Context : Understanding the History of ASP.NET - Web Development Today – Key Benefits of ASP.NET MVC - First MVC Application : Preparing Visual Studio - Creating a New ASP.NET MVC Project – The MVC Pattern: The History of MVC - Understanding the MVC Pattern.

**TEXT BOOKS**

1. **Beginning ASP.NET 4 in VB 2010**, Matthew MacDonald, Apress, Berkeley, CA, USA, 2010.
2. **Pro ASP. NET MVC 5**, Adam Freeman, Apress, Fifth Edition, 2013.
3. **Programming WCF Services**, Juval Lowy and Michael Montgomery, O'Reilly Publications, 4<sup>th</sup> Edition, 2015

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2019-20

Subject Code:

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**Effective from the academic year: 2019-20**

**SIXTH SEMESTER**

**CORE: WEB TECHNOLOGY LAB**

**Objective of the subject:** The lab sessions includes creation of web pages using ASP.NET, manipulation with web controls and multiple format display using ADO.NET.

1. Creation of ASP.NET Web Page.
2. Creating and manipulation with Web Controls.
3. Create and manipulate with Rich Web Controls (Ad rotator).
4. Create and manipulate with Rich Web Controls (Calendar).
5. Create and manipulate with Rich Web Controls (Treeview).
6. Creation and manipulation of User Controls.
7. Connecting to database with GridView control.
8. Database manipulation using GridView control.
9. Displaying the data in GridView control with sorting and paging.
10. An MVC application.

**Note**

Develop a project / case study using the above applicable concepts.

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**SIXTH SEMESTER**

**ELECTIVE II: MOBILE PROGRAMMING**

**Objective of the Subject:** To introduce the mobile application fundamentals and to enable the students for writing android based script for mobile application development.

**UNIT I:**

**(10 Hrs)**

All about Android: Versions – Java-XML-Linux-The android system architecture. Creating first app-Starting the Android Studio IDE-Launching and running first application. Examining a Basic Android app- A project's files

**UNIT II:**

**(10 Hrs)**

Improving the application: Improving the layout - Localizing application-Responding to check box events – Displaying Images-Sending in the order. Android Activities: All about Activities – Intents – Using a Context- The Activity lifecycle-lifecycle methods.

**UNIT III:**

**(10 Hrs)**

Android layouts: Linear layout – Relative layout-Table layout-Grid layout-Frame layout-Using a scroll view. Menus: Options Menu-Context menu-Popup menu –Simple notification.

**UNIT IV:**

**(11 Hrs)**

Designing user interface with views: Using Basic Views-Text View-Button, Image button, Edit text, Checkbox, Toggle Button, Progress bar View, Auto Complete Text View. Using Picker Views-Using List Views to display long lists

**UNIT V:**

**( 9 Hrs)**

Data persistence: Creating and using database – Content providers: Sharing data in android-Using a content provider. Messaging: SMS Messaging - Sending E-mail.

**TEXT BOOKS**

1. Barry Burd, Android Application Development for Dummies, Wiley India Pvt. Ltd, 2<sup>nd</sup> edition, 2015.
2. Wei – Meng Lee, Beginning Android 4 Application Development, John Wiley, 2012.

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2019-20

Subject Code:

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**Effective from the academic year: 2019-20**

**SIXTH SEMESTER**

**ELECTIVE II: CLOUD COMPUTING**

**Objective of the subject:** The paper introduces cloud computing and makes students familiar with the concept of Cloud Computing. The paper includes the core issues of cloud computing, infra structure and virtualization.

**UNIT I**

**(10 Hrs)**

First Drive: Introduction – Essentials – Benefits - Types of cloud - Need for Cloud - Business and IT perspective - Cloud and Virtualization - Cloud Services Requirements - Cloud and Dynamic Infrastructure - Cloud Computing Characteristics - Cloud Adoption-Cloud Rudiments. Cloud Deployment Models – Introduction - Cloud Characteristics - Measures Service - Cloud Deployment Models - Security in Public Cloud - Public versus Private Cloud - Cloud Infrastructure Self-Service.

**UNIT-II:**

**(10 Hrs)**

Cloud as a service: Introduction - Gamut of Cloud Solutions - Principal Technologies - Cloud Strategy- Cloud Design and Implementation Using SOA - Conceptual Cloud - Cloud Service Defined. Cloud Solutions: Introduction-Cloud Eco system - Cloud Business Process Management - Cloud Service Management – On - Premise Cloud Orchestration and Provisioning Engine - Computing on Demand(CoD) - Cloud sourcing.

**UNIT-III**

**(10 Hrs)**

Cloud offerings: Introduction - Information storage, Retrieval, Archive and Protection - Cloud Analytics - Testing Under cloud - Information Security - Virtual Desktop Infrastructure - Storage Cloud. Cloud Management: Introduction: Resiliency - Provisioning-Asset Management - Cloud Management - High availability and disaster recovery - Charging Models, Usage Reporting, Billing and Metering.

**UNIT-IV**

**(10 Hrs)**

Cloud virtualization technology - Virtualization defined - Virtualization Benefits - Server Virtualization - Virtualization for x86 Architecture - Hypervisor Management Software - Virtual Infrastructure Requirements.

**UNIT-V**

**(10 Hrs)**

Cloud Infrastructure: Introduction-Storage Virtualization - Storage Area Networks - Network Attached Storage - Cloud Server Virtualization - Networking Essential to Cloud.

**TEXT BOOK**

1. **Cloud Computing**, Dr.Kumar Saurabh, Wiley India, 2<sup>nd</sup> Edition, Reprint 2012.

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**SIXTH SEMESTER**

**ELECTIVE II: INTERNET OF THINGS**

**Objective of the subject:** This subject highlights on physical design, logic design, enabling technologies of IoT, IoT system management and design methodology, IoT physical devices and cloud offerings.

**UNIT I:** (10 Hrs)  
Introduction to Internet of things: Introduction- Definition and Characteristics - Physical design of IOT-Logical design of IOT

**UNIT II:** (10 Hrs)  
IOT Enabling Technologies-IOT Levels and Deployment templates – Domain Specific IOTs – Home Automation – Smart Cities – Agriculture.

**UNIT III:** (10 Hrs)  
IOT Platforms Design Methodology – Purpose and Requirements Specification – Process Specification – Domain Model Specification – Information Model Specification –Service Specification – IoT Level Specification- Case Study on IoT System for Weather Monitoring.

**UNIT IV:** (10 Hrs)  
IOT physical devices and Endpoints – IoT Device –Exemplary Device: Raspberry Pi – About the Board- Linux on Raspberry Pi - Raspberry Pi Interfaces – Serial – SPI – I2C.

**UNIT V:** (10 Hrs)  
Case Studies illustrating IoT Design: Home Automation: Smart lighting- Cities : Smart Parking-Environment: Air pollution monitoring-Productivity application: IoT Printer.

**TEXT BOOK**

1. Arshdeep Bahga ,Vijay Madiseti, Internet Of Things-A hands on approach, -2014.

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**SIXTH SEMESTER**

**ELECTIVE II : ENTERPRISE RESOURCE PLANNING**

**Objective of the subject:** This paper highlights on the introduction of ERP and its benefits. An overview about Business Engineering and Business Modeling is discussed. Method of ERP implementation and Vendors are given.

**UNIT I**

**(10 Hrs)**

ERP Curtain Riser: Accommodating variety-Integrated Management Information-Seam less Integration- SCM-Resource management-Data model-Scope-Technology-Benefits-Evolution-Revisited-Modern Enterprise. Business Engineering: Overview-Significance-Principles-IT- Concerns.

**UNIT II**

**(10 Hrs)**

Business Modeling: Building the model- Problems. ERP Implementation: Roles-Customization-Precautions-Post implementation- Implementation method. Competitive Advantage.

**UNIT III**

**(10 Hrs)**

ERP Domain: MFG/PRO- IFS/Avalon-Bann IV-SAP 82- SDAP R/3 Applications- Indian ERP Package- Arrival of ERP III- problems.

**UNIT IV**

**(10 Hrs)**

Marketing Of ERP: Overview-Market Dynamics and Competitive Strategy- Managing strategy process-Relationship marketing- Developing strategies- Planning Programmes- Participants-Sales cycle.

**UNIT V**

**(10 Hrs)**

Case Study: Benz-Keen Hin Industries-Bull Electronics- Twentieth Century Companies- Ameritech-Essar steel- Jindal Iron-Godrej Soaps-IREDA-Sara Case Study,(Roots Industries)

**TEXT BOOK**

1. **Enterprise Resource Planning Concepts and Practice**, Vinod Kumar Garg and N.K. Venkitakrishnan, PHI Publication, 2<sup>nd</sup> Edition, 22<sup>nd</sup> Reprint 2012. (Unit I-V).

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**Effective from the academic year: 2019-20**

**SIXTH SEMESTER**

**ELECTIVE II: INTELLECTUAL PROPERTY RIGHTS**

**Objective of the subject:** This course introduces the fundamentals of Intellectual Property rights, Law of copy rights, patents and trade secrets.

**UNIT - I:**

**(10 Hrs)**

**Introduction to Intellectual property:** Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

**UNIT - II:**

**(10 Hrs)**

**Trade Marks:** Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

**UNIT - III:**

**(10 Hrs)**

**Law of copy rights:** Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. **Law of patents:** Foundation of patent law, patent searching process, ownership rights and transfer

**UNIT - IV:**

**(10 Hrs)**

**Trade Secrets:** Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation. **Unfair competition:** Misappropriation right of publicity, False advertising.

**UNIT - V:**

**(10 Hrs)**

**Plagiarism – Plagiarism occurrence – positive reasons for not plagiarizing – Plagiarism in Practice – Avoiding Plagiarism.**

**TEXT BOOKS**

1. Intellectual property right, Deborah, E. Bouchoux, Cengage learning Publications, 2008.
2. Intellectual Property Right - Unleashing the knowledge economy, Prabuddha Ganguli, Tata Mc Graw Hill Publishing Company Ltd, 2008.
3. The Little book of Plagiarism, Richard A.Posner, Pantheon Publishers, 1<sup>st</sup> Ed, 2007.



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**SIXTH SEMESTER**

**SKILL BASED SUBJECT: SOFT SKILLS**

**Objective of the subject:** This course content guides and helps students to concentrate on career planning, group discussion, art of listening skill, art of speaking skill, body language, team building and team work, etiquette, manners, CV writing, interview skills, and dress code.

**UNIT I**

**(10 Hrs)**

Soft skills: Introduction – Importance of Soft Skills – Attributes Regarded as Soft Skills – Practicing Soft Skills – Know Thyself / Self Discovery: Importance of Knowing Yourself – Process of Knowing Yourself – Developing Positive Attitude .

**UNIT II**

**(10 Hrs)**

Forming Values: Meaning – Values Relating to Education – Values Relating to Self and Others- Important of Values – Types of Values: Terminal and Instrumental values, Power of Values – Examples for Values. Career Planning: Guidelines for Choosing a Career – Myths about Choosing a Career – Tips for Successful Career Planning.

**UNIT III**

**(10 Hrs)**

Art of Listening: listening – Benefits of Active Listening – Kinds of Listening – Art of Reading: Benefits of Reading – Different Types of Reading – The SQ3R Technique – Art of Speaking: Defining Communication – Special Features of Communication – Importance of Communication – Tips for Effective Communication.

**UNIT IV**

**(10 Hrs)**

Body Language: Forms of Body Language – Parts of Body Language – Types of Body Language - Team Building and Teamwork: Aspects of Team Building – Skills Needed for Teamwork – A Model of Team Building - Team Vs Group - Characteristics of Effective Team – Role of a Team Leader – Role of Team Members - Group Discussion(GD): Meaning of GD – Skills Required in a GD – Essential Elements of GD.

**UNIT V**

**(10 Hrs)**

Etiquette and Manners: Introduction – Classification of Etiquette – Manners: Introduction – Why Should You Practice Good Manners? - Preparing CV/Resume: Meaning – Types of Resumes – CV Writing Tips – Interview Skills: Types of Interview – Types of Questions Asked – Dress Code at Interview.

**TEXT BOOKS**

1. Dr. K. Alex, “**Soft Skills Know yourself & Know the world**”, S.Chand & Company Ltd, 2009.
2. Gopalaswamy Ramesh, Mahadevan Ramesh, *The ACE of Soft Skills: Attitude, Communication, and Etiquette for Success*, 1st Edition, Kindle Edition, *Pearson Education, 2010.*